



# USER MANUAL

— Longo programmable controller  
LPC-2.MC7 main control module

**Version 3**

Written by SMARTEH d.o.o.  
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User Manual

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**STANDARDS AND PROVISIONS:** Standards, recommendations, regulations and provisions of the country in which the devices will operate, must be considered while planning and setting up electrical devices. Work on 230 VAC network is allowed for authorized personnel only.

**DANGER WARNINGS:** Devices or modules must be protected from moisture, dirt and damage during transport, storing and operation.

**WARRANTY CONDITIONS:** For all modules LONGO LPC-2 – if no modifications are performed upon and are correctly connected by authorized personnel – in consideration of maximum allowed connecting power, we offer warranty for 24 months from date of sale to end buyer. In case of claims within warranty time, which are based on material malfunctions the producer offers free replacement. The method of return of malfunctioned module, together with description, can be arranged with our authorized representative. Warranty does not include damage due to transport or because of unconsidered corresponding regulations of the country, where the module is installed.

This device must be connected properly by the provided connection scheme in this manual. Misconnections may result in device damage, fire or personal injury.

Hazardous voltage in the device can cause electric shock and may result in personal injury or death.

**NEVER SERVICE THIS PRODUCT YOURSELF!**

This device must not be installed in the systems critical for life (e.g. medical devices, aircrafts, etc.).

If the device is used in a manner not specified by the manufacturer, the degree of protection provided by the equipment may be impaired.

Waste electrical and electronic equipment (WEEE) must be collected separately!

LONGO LPC-2 complies to the following standards:

- EMC:EN 61000-6-2 (EN 50082), EN 61000-6-4 (EN 50081)
- LVD: IEC 61131-2
- Vibrations and climatic-mechanical: EN 60068-2-6, EN 60068-2-27, EN 60068-2-29

Smarteh d.o.o. operates a policy of continuous development. Therefore we reserve the right to make changes and improvements to any of the products described in this manual without any prior notice.

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## 1 DESCRIPTION

LPC-2.MC7 main control module is a heart of LPC-2 (LONGO Programmable Controller) system. It's general purpose is to execute application software, exchange data with I/O and communication modules and provide power supply to attached I/O and communication modules.

Module is powered directly from the 230 VAC main power supply. There are two LEDs. Green (PWR) indicates power supply presence, red one (STOP) indicates LPC-2.MC7 main control module state (refer to the Table 8).

Application program is easy to load, control and monitor from the LPC Manager software using standard RS232 interface and PMC programming cable.

LPC-2.MC7 main control module has integrated standard RS232 (COM1, refer to the Table 3). It acts like slave - only responds to queries from master with polling time 750 ms or more.

LPC-2.MC7 can communicate with modules from LPC-2 program like room temperature control panel LPC-2.P01, LPC-2.P02, RFID access control LPC-2.ID1, LPC-2.ID2, LPC-2.ID3 etc. Up to four such modules can be connected to the LPC-2.MC7 COM2 connector (refer to the Figure 2 and Table 5).

NOTE: For proper system configuration and data allocation refer to LPC Composer help menu.



## 2 FEATURES

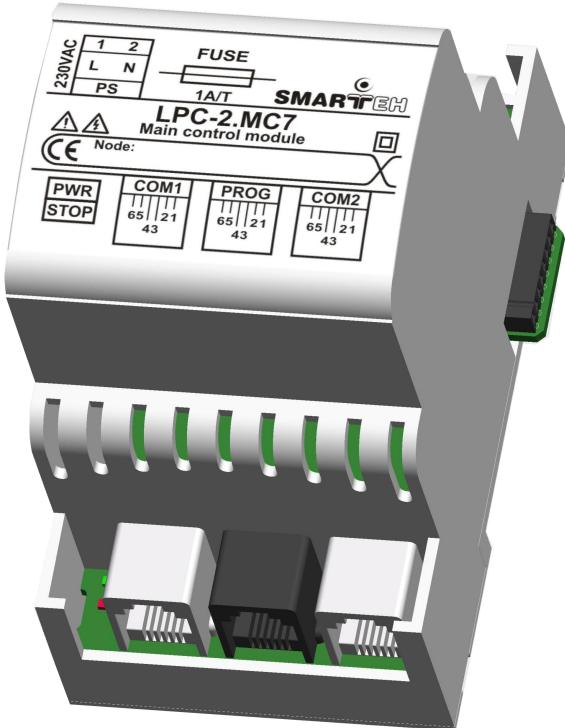


Figure 1: LPC-2.MC7 module

**Table 1: Technical data**

Ladder programming

Application loading, controlling and monitoring

230 VAC switching power supply (no additional power supply required)

Galvanic separated supply for internal BUS and I/O connections

Stand-alone or network operation in combination with network communication module(s)

RS232 half duplex serial port

RS485 communication port

Connectivity to supervision (SCADA) system through network communication module(s)

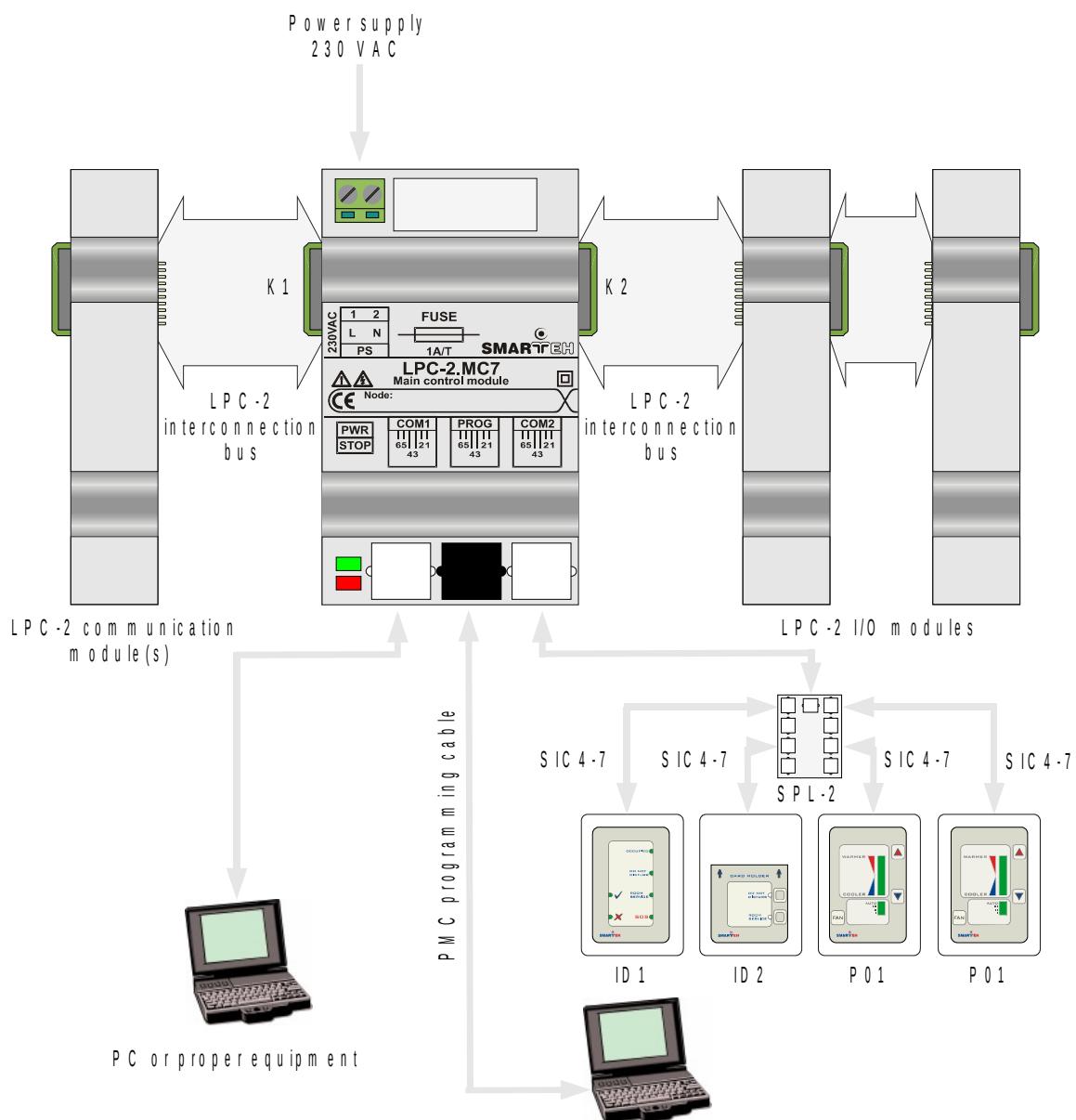
Standard DIN EN50022-35 rail mounting



## 3 INSTALLATION

### 3.1 Connection scheme

**Figure 2: Connection scheme**



**Table 2: PS<sup>1</sup>**

PS.1 (L)	230 VAC, 50 Hz	Power supply - line
PS.2 (N)	230 VAC, 50 Hz	Power supply - neutral

**Table 3: COM1**

COM1.1	N.C.	Not connected
COM1.2	GND	Ground
COM1.3	15 VDC / 200 mA	Power supply output
COM1.4	RS232: TxD •→	Data send output
COM1.5	RS232: RxD •←	Data receive input
COM1.6	N.C.	Not connected

**Table 4: PROG**

PROG.1	RS232: DTR	Programming, controlling, monitoring
PROG.2	GND	Ground
PROG.3	N.C.	Not connected
PROG.4	RS232: Rx •←	Programming, controlling, monitoring
PROG.5	RS232: Tx •→	Programming, controlling, monitoring
PROG.6	RS232: RTS	Programming, controlling, monitoring

**Table 5: COM2**

COM2.1	N.C.	Not connected
COM2.2	GND	Ground
COM2.3	15 VDC / 200 mA	Power supply output
COM2.4	RS485: A	Data receive/send line A
COM2.5	RS485: B	Data receive/send line B
COM2.6	N.C.	Not connected

**Table 6: K1**

Internal BUS	Data & DC power supply	Connection to comm. module(s)
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<sup>1</sup> Supply wiring: power supply wires must have cross sectional area at least 0.75 mm<sup>2</sup>. Minimum temperature rating of wire insulation must be 85 °C.



**Table 7: K2**

Internal BUS	Data & DC power supply	Connection to I/O module(s)
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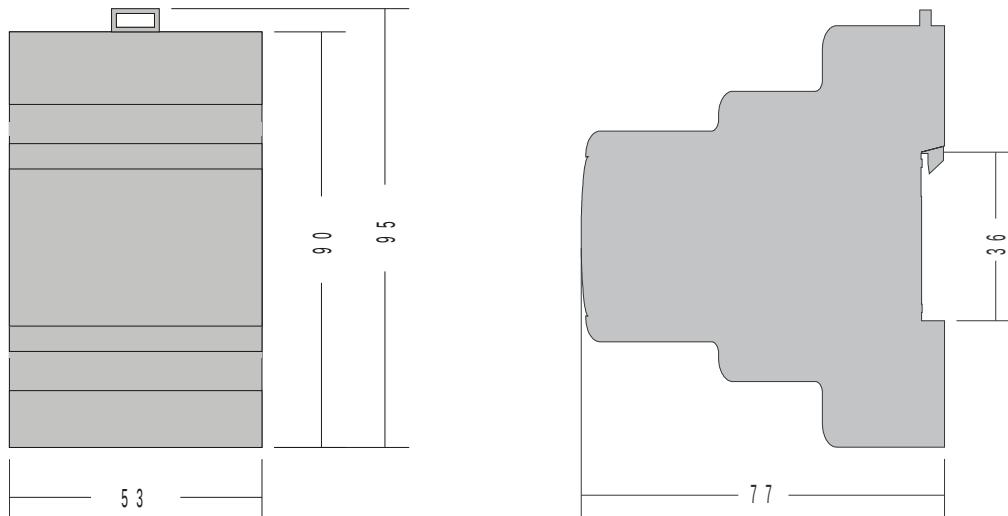
**Table 8: LEDs**

PWR	Green LED: power supply	On: OK Off: power off or fuse blown
STOP	Red LED: controller state	Off: running On: stopped



## 3.2 Mounting instructions

**Figure 3: Housing dimensions**



- Dimensions in millimeters.

**EXTERNAL SWITCH OR CIRCUIT-BREAKER AND EXTERNAL OVERCURRENT PROTECTION:** The unit is allowed to be connected to installation with over current protection that has nominal value of 16 A or less.

**RECOMMENDATION ON SWITCH OR CIRCUIT-BREAKER PROTECTION:** There should be two poles main switch in the installation in order to switch off the unit. The switch should meet the requirements of standard IEC60947 and have a nominal value at least 6 A. The switch or circuit-breaker should be within easy reach of the operator. It should be marked as the disconnecting device for the equipment.

All connections, module attachments and assembling must be done while module is not connected to the main power supply.

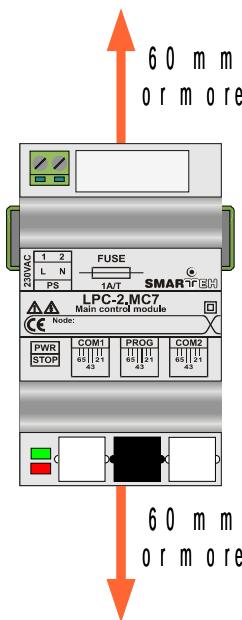


**Mounting instructions:**

1. Switch OFF main power supply.
2. Mount LPC-2.MC7 module to the provided place inside an electrical panel (DIN EN50022-35 rail mounting).
3. Mount other LPC-2 modules. Mount each module to the DIN rail first, then attach modules together through K1 and K2 connectors.
4. Connect communication wires to the connectors according to the connection scheme in Figure 2.
5. Connect 230 VAC power supply wires to the connector according to the connection scheme in Figure 2.
6. Switch ON main power supply.
7. Power (PWR) green LED should switch on. Also red LED (STOP) should switch on for approx. 2 sec. and then switch off for normal operation according to the Table 8.

Dismount in reverse order. For mounting/dismounting modules to/from DIN rail a free space of at least one module must be left on the DIN rail.

NOTE: LPC-2.MC7 main control module should be powered separately from other electrical appliance connected to LPC-2 system. Signal wires must be installed separately from power and high voltage wires in accordance with general industry electrical installation standard.

**Figure 4: Minimum clearances**


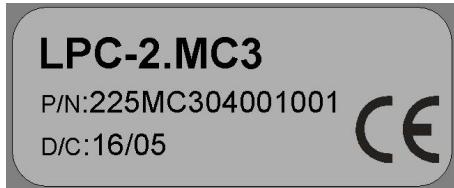
The clearances above must be considered before module mounting.



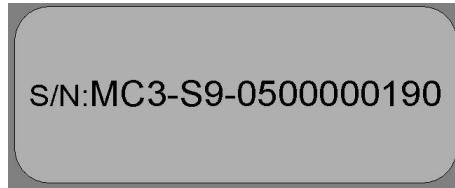
### 3.3 Module labeling

**Figure 5: Labels on housing**

Label 1 (MC3 sample):



Label 2 (MC3 sample):



**Label 1 description:**

1. **LPC-2.MC3** is the full product name.
2. **P/N:225MC3040001001** is the part number.
  - **225** – general code for product family,
  - **MC3** – short product name,
  - **04001** – sequence code,
    - 04 – year of code opening
    - 001 – derivation code
  - **001** – version code (reserved for future HW and/or SW firmware upgrades).
3. **D/C:16/05** is the date code.
  - **16** – week and
  - **05** – year of production.

**Label 2 description:**

1. **S/N:MC3-S9-0500000190** is the serial number.
  - **MC3** – short product name,
  - **S9** – user code (test procedure, e.g. Smarteh person xxx),
  - **0500000190** – year and current stack code,
    - 05 – year (last two cyphers)
    - 00000190 – current stack number; previous module would have the stack number 00000189 and the next one 00000191.



## 4 TECHNICAL SPECIFICATIONS

**Table 9: Technical specifications**

Main power supply	230 VAC +10/-15 %, 50/60 Hz
Connection type	screw type connectors for stranded wire 0.75 to 2.5 mm <sup>2</sup>
Power consumption (no additional modules connected)	2 W
Max. total power consumption	25 W
Number of RS232 ports	1
Communication parameters	19200 bps, 8, 1, none, half duplex, no flow control
Number of RS485 ports	1
Communication port usage	dedicated
Application controller	Intel 8051 based
Application uploading	RS232
Dimensions (L x W x H)	90 x 53 x 77 mm
Weight	200 g
Ambient temperature	0 to 50 °C
Ambient humidity	max. 95 %, no condensation
Maximum altitude	2000 m
Mounting position	vertical
Transport and storage temperature	-20 to 60 °C
Fuse	1 A (T-slow), 250 V
Pollution degree	2
Overvoltage category	II
Electrical equipment	Class II (double insulation)
Protection class	IP 30



## 5 PROGRAMMERS GUIDE

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### COM2- RS485 Communication port

LPC-2.MC7 controller includes a communication port (RS-485) on COM2 RJ-12 connector. Up to four RS-485 modules can be connected to the COM2 port by using SPL-2 splitter.

If several modules are attached to COM2 port, we are talking about RS-485 network. Star topology has best characteristics in this case.

Each RS-485 module connected to MC7 has its own RS-485 network address, by which it is recognized. For instance, all ID1 modules have the same address, hence only one ID1 can be attached to the same MC7 controller. This rule applies to ID1 and ID2 RS-485 modules while P01 and ID3 can be set any possible address if not used before by other RS-485 modules.

### COM1- RS232 Communication port

LPC-2.MC7 controller includes also a communication port (RS-232) on COM1 RJ-12 connector. One RS-232 master device can be connected to this port.

Communication parameters are:

Speed: 19200 bps / Data bits: 8 / Stop bits: 1 / Parity: NONE / Flow control: NO

The communication is half-duplex with a frame in ASCII format. MC7 acts like slave while connected device (e.g. PC with LPC Tester software) must be a master with polling time 750ms or more. Master device starts the communication by sending a frame of 26 bytes which starts with 'S' character (byte [0]) and ends with two checksum bytes (CS2 and CS1). There are 22 data bytes in the frame from byte [1] to byte [22].

Calculation for both checksum bytes is done for data bytes and byte [23]:

CS2: execute EXOR function over whole buffer except byte[0]

CS1: sum of all '1' bits in all data bytes except byte[0]

Example:



Byte No.	Value	Byte No.	Value
00	53	13	03
01	0F	14	5C
02	F0	15	03
03	01	16	CA
04	36	17	04
05	01	18	38
06	A4	19	04
07	02	20	A6
08	12	21	05
09	02	22	14
10	80	23	00
11	02	CS2	0A
12	EE	CS1	36

Byte [23] (SEL) is used for memory (type, R/W) selection. Master devices W/R cycle can be from 500ms to 1s regarding the number of connected communication modules (NL1, NE1) left from MC7 controller. MC7 answers to master device within 50 ms with its frame (length 26 bytes).

Description of MC7 memory access from master device using memory selector (byte [23]):

SEL = 0: write/read to/from RAM1

SEL = 2: write/read to/from RAM2

SEL = 64: read from EEPROM1

SEL = 65: write to EEPROM1

SEL = 66: read from EEPROM2

SEL = 67: write to EEPROM2

SEL = 68: read from EEPROM3

SEL = 69: write to EEPROM3

SEL = 70: read from EEPROM4

SEL = 71: write to EEPROM4

EEPROM1 and EEPROM2 can be used for storing values in case of black-out or to set initial values of variables after power up.

EEPROM3 and EEPROM4 are used for storing IP and MAC addresses for LPC-2.NE1 (ethernet) module on positions 1 and 2. EEPROM3 and EEPROM4 can only be accessed from LPC Tester software through COM1 communication port. User can preset IP address of an LPC-2.NE1 (ethernet) module or can set it from LPC manager application (refer to LPC-2.NE1 module help for further information on setting IP address from application). MAC addresses are preset by the manufacturer and are unique for eachLPC-2.NE1 (ethernet) module.



**CAUTION:** EEPROM has limited number of write cycles, therefore this locations must not be used for frequent writes.



## 6 CHANGES

The following table describes all the changes to the document.

Date	V.	Description
1.7.2012	003	CGP General update.
11.5.2010	002	Updated warranty permanence.
17.4.2007	001	The initial version, issues as <i>LPC-2.MC7 main control module UserManual</i> .



## **7 NOTES**

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